

CLAIMS

What is claimed is:

1. 1. A method of manufacturing a plurality of MEMS devices comprising:
  - 3 aligning a plurality of MEMS dice formed on a first substrate with a plurality of non-silicon caps having at least one electrical via; and
  - 6 bonding the plurality of MEMS dice with the plurality of non-silicon caps to form a plurality of MEMS devices, the plurality of MEMS devices having an interior and an exterior, wherein the electrical via extends from the interior to the exterior.
2. 2. The method of claim 1, wherein the bonding of the plurality of MEMS dice with the plurality of non-silicon caps hermetically seals the plurality of MEMS devices.
- 1 3. 3. The method of claim 2 further comprising:
  - 2 dicing the plurality of MEMS devices.
- 1 4. 4. The method of claim 3 further comprising:

bonding one of the plurality of MEMS devices to an integrated circuit chip.

1 5. The method of claim 1, wherein the bonding of the  
2 plurality of MEMS dice with the plurality of non-silicon  
3 caps is achieved by a thermocompression bonding.

1 6. The method of claim 5, wherein the bonding of the  
2 plurality of MEMS dice with the plurality of non-silicon  
3 caps is achieved by a gold-to-gold thermocompression  
4 bonding.

1       7.           The method of claim 1, wherein the bonding of the  
2       plurality of MEMS dice with the plurality of non-silicon  
3       caps is achieved by solder bonding.

1 8. The method of claim 1, wherein the bonding of the  
2 plurality of MEMS dice with the plurality of non-silicon  
3 caps is achieved by eutectic bonding.

1 9. An apparatus comprising:  
2 a plurality of MEMS dice formed on a substrate;  
3 and

4                   a plurality of caps bonded to the plurality of  
5                   MEMS dice, the plurality of caps having at least one  
6                   electrical via extending from a first side of the  
7                   plurality of caps to a second side of the plurality of  
8                   caps.

1               10.       The apparatus of claim 9, wherein one of the  
2               plurality of MEMS dice and one of the plurality of caps  
3               forms a device interior and a device exterior, and the  
4               electrical via extends from the device interior to the  
5               device exterior.

1               11.       The apparatus of claim 10, wherein the plurality  
2               of caps comprises ceramic.

1               12.       The apparatus of claim 11, wherein the plurality  
2               of caps are formed on a common substrate.

1               13.       The apparatus of claim 11, wherein the plurality  
2               of caps are coupled to each other by a carrier.

1               14.       The apparatus of Claim 10, wherein the electrical  
2               via is coupled to a solder ball on the device exterior.

1       15.       The apparatus of Claim 10, wherein the plurality  
2       of caps comprises a zero-shrink ceramic.

1       16.       A apparatus comprising:  
2                a MEMS die formed on a semiconductor substrate;  
3                and  
4                a ceramic cap bonded to the MEMS die to form a  
5                hermetically sealed interior, the ceramic cap having  
6                at least one electrical via extending from a  
7                hermetically sealed interior through the ceramic cap  
8                to an exterior.

1       17.       The apparatus of claim 16, wherein the at least  
2        one electrical via is coupled to a solder ball on the  
3        exterior.

1       18.       The apparatus of claim 16 further comprising:  
2                a circuit board, wherein the circuit board is  
3                electrically coupled to the MEMS die by a solder ball  
4                and the electrical via.

1       19.       The apparatus of claim 16 further comprising:

2                   an integrated circuit chip, wherein the  
3                   integrated circuit chip is electrically coupled to the  
4                   MEMS die by a solder ball and the electrical via.

1                   20.           The apparatus of claim 16, wherein the ceramic  
2                   cap is a zero-shrink ceramic.